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USSR EXPERIMENTS WITH LOW-GRADE COAL IN FIREBOXES WITH SHAKER DEVICES

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Low-grade power coals are found in many coal basins of the USSR. Their combustion in manually operated fireboxes presents some difficulty since such coal lowers the steam productivity and efficiency of the boilers, and puts an additional burden on the stokers because of the increased amount of coal burned and the large yield of ash and slag.

A firebox with a shaker device, designed by Yu. G. Vasil'yev, has demonstrated possibilities for increasing effective utilization of low-grade coal and lightening the work of the stokers. Complete mechanization of combustion of coal with a high moisture, dust, and ash content is effected with this firebox.

Two boilers in the boilerhouse of the Kuntsevo Weaving and Finishing Mill have been equipped with such fireboxes. One of these has been operating continually since 1948 on Moscow Basin run-of-the-mine coal.

A series of experiments was conducted to determine the suitability of various local, low-grade varieties of coal for burning in such fireboxes. Run-of-the-mine lignite from an Angren open pit, Donbass PS (steam-caking) coal with a high ash content, and Donbass PZh (steam-fat) coal from a coal-cleaning plant were used.

At the end of December 1950, 170 tons of coal arrived from an Angren open pit in the Central Asia coal basin, and experiments were carried on for 2 months. Fifty percent of this coal consisted of lumps greater than 100 millimeters in size, and fines with a high degree of moisture predominated in the remaining 50 percent. These experiments led to the following conlusions:

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1. Angren run-of-the-mine coal with a high moisture content can be used effectively in mechanized fireboxes with a shaker device. Complete, steady combustion and normal steam productivity of the boiler will be assured if the firebox has an ignition shaft (in case there is no forced draft with preheated air).

2. Enterprises in Central Asia must be supplied with Angren coal consisting of lumps not over 100 millimeters in size to assure most effective burning in fireboxes.

3. Such fireboxes assure complete mechanization of the combustion of Angren coal, and can be recommended as equipment for boilers of low or average capacity in regions of Central Asia now being supplied with Angren coal.

For the experiments with PS coal, which were also successful, 90 tons from the Bogurayevugol' Trust of the Rostovugol' Combine were used; they consisted of lumps, 14 percent of which were greater than 10 millimeters in size, 32 percent from 10 to 4 millimeters, and 54 percent fines less than 4 millimeters in size.

The industrial product, a total of 100 tons, came from the Novouzlovskiy TsOF (Central Coal-Cleaning Plant) and was a bituminous coal with a very high ash content. It consisted of lumps, 23 percent of which were greater than 10 millimeters in size, 41 percent from 10 to 4 millimeters, and 36 percent fines of less than 4 millimeters. The boiler worked more than 80 hours on the industrial coal with good results.

In October 1951, experiments of a similar nature were conducted using Pechora basin run-of-the-mine PZh coal. Good results were obtained. Additional satisfactory experiments have been made with Donbass anthracite AS (pea coal).

As a result of these experiments the following conclusions have been drawn:

1. The firebox with a shaker device designed by Yu. G. Vasil'yev is reliable and suitable for burning a great number of USSR power fuels, ranging from the highly moist Angren lignite (moisture content 39.5-43.5 percent) to Donbass anthracite.

2. The inclusion in the firebox of an ignition shaft permits burning the wettest types of lignite, in the absence of a forced draft with preheated air. The grate of the firebox is so constructed as to permit the burning of all kinds of low-grade fuels even if they have a high fines content.

3. In burning a specific type of coal, uniform operation must be arranged for the movement of the shaker device, permitting a completely automatic regulation of the combustion process.

4. These fireboxes are simple in construction and relatively inexpensive. They should be widely introduced both in the reconstruction of old boilers and in installing new boilers of low and average capacity.

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